Golden Sun Moth *Synemon plana*: discovery of new populations around Melbourne

Ian Endersby[1] and Sally Koehler[2]

[1]56 Looker Road, Montmorency, Victoria 3094
[2]Biosis Research Pty Ltd, 38 Bertie Street (PO Box 489), Port Melbourne, Victoria 3207
[3]Corresponding author Email skoehler@biosisresearch.com.au

Abstract
The Golden Sun Moth *Synemon plana* is a small diurnal moth that is critically endangered in Australia. The species had been known from just six areas in Victoria until 2003, when new populations were discovered at the Craigieburn and Cooper Street Grasslands north of Melbourne. In response to these discoveries, Biosis Research Pty Ltd has undertaken a number of targeted surveys for Golden Sun Moth as part of ecological investigations of land proposed for development around Melbourne. This report provides a general outline of the species' habitat requirements and biology, and briefly describes the discovery of additional populations and implications of these survey results.
(*The Victorian Naturalist* **123** (6), 2006, 362-365)

Introduction

Golden Sun Moth *Synemon plana* (see cover) is a small diurnal moth from the family Castniidae that is listed as critically endangered in Australia under the Environment Protection and Biodiversity Conservation Act 1999. The species was once widespread in the temperate grasslands and grassy woodlands of Victoria, the Australian Capital Territory and southern New South Wales but is now restricted to small disjunct populations throughout its former range. Surveys undertaken in 2000 reported Golden Sun Moths from 43 sites in New South Wales and 12 in the Australian Capital Territory (Clarke 2001). Prior to 2003, the species had been reported from just six areas in Victoria – Broadford, Tallarook, Flowerdale, Dunkeld, Hamilton and near Nhill-Salisbury (C O'Dwyer pers. comm.).

In December 2003 a substantial population of 'hundreds' of sun moths was found at the Craigieburn Grasslands by members of the Merri Creek Management Committee and Friends of the Craigieburn Grasslands (van Praagh 2004). They also sighted four males in the Cooper Street Grasslands in Campbellfield. Subsequently another population was discovered in Craigieburn, approximately 7 km north of the Craigieburn Grasslands, with 30-50 individual males observed (L Macmillan, Merri Creek Manage-ment Committee, pers. comm.).

In response to these recent discoveries, Biosis Research Pty Ltd undertook a targeted survey as part of ongoing ecological investigations of land proposed for residential subdivision in Epping, Victoria. During December 2004 and January 2005, four populations were located that were not previously known to exist, and were occupying habitat not previously considered typical for the species, as the vegetation was generally dominated by Kangaroo-grass *Themeda triandra* rather than wallaby-grasses *Austrodanthonia* spp.

This increased knowledge led to surveys being conducted on several other properties in the Craigieburn/Epping area that were known to support potential habitat for the species. Surveys were also extended to include the Deer Park area as the Golden Sun Moth historically occurred through western Melbourne, as indicated by Museum Victoria records collection from Altona, Broadmeadows, Keilor and Glenroy (Fig. 1). These surveys revealed several additional populations of Golden Sun Moth.

Habitat requirements

Generally, it has been thought that Golden Sun Moths are restricted to native grassland and grassy woodland areas dominated by wallaby grasses *Austrodanthonia* spp., which are important as larval food plants. Floristic and soil surveys from Golden Sun Moth sites undertaken by

O'Dwyer (1999) and O'Dwyer and Attiwill (1999) found the species occupied native grasslands and grassy woodlands with greater than 40% cover of *Austrodanthonia* spp. Habitat structure is likely to be an important element for species such as the Golden Sun Moth in which females display from a sedentary position to attract a patrolling partner. It is therefore expected that grasslands characterised by an open tussock structure and the presence of *Austrodanthonia* spp. provide the most suitable habitat.

Biology

The biology of the Golden Sun Moth is summarised below, based on information from ACT (1998), Clarke and O'Dwyer (2000), O'Dwyer *et al.* (2000) and van Praagh (2004).

Females are poor fliers and tend to bask, flashing their bright orange hindwings to attract patrolling males. Individual female territories are small and they are thought to walk between tussocks to lay their eggs. Based on comparisons with *Synemon magnifica* from Canberra, it is assumed that females lay their eggs (oviposit) between the tillers of *Austrodanthonia* grasses, the larval food plant. Early instar caterpillars feed internally on the plant tissues while later instars feed on the underground parts of the grass for up to two (or even three) years before pupating and emerging through a previously prepared tunnel to the surface.

The main adult flight season near Melbourne extends from late November to January, depending on temperature and site aspect. Adults lack functional mouthparts so their life span is only a few days, but adult emergence occurs continually throughout the flight season.

Golden Sun Moths are diurnal (day flying), with males most readily observed as they patrol for females. Male flight is low (~1 m), fast, and can be prolonged, but they are rarely found more than 100 m from suitable breeding habitat (Clarke and O'Dwyer 2000).

New populations around Melbourne

Craigieburn/Epping area

Six new populations have been found during Biosis Research Pty Ltd surveys in the Craigieburn/Epping area. Initially four new populations ranging from seven to over 60 individual males were recorded during surveys in the Epping area during the 2004/5 flight season. They were observed in association with stony rises with a lower density of *Austrodanthonia* spp. than previously considered suitable habitat. Additional populations were subsequently found at two other localities in the Craigieburn area during surveys in the 2004/5 and 2005/6 seasons, with three males observed flying at one site and 13 males at the other.

Interestingly, a number of the male Golden Sun Moths were observed in flight over paddocks, as far as 400 m from the nearest patch of suitable wallaby grass breeding habitat. This finding is substantially different from the 100 m previously considered in the scientific literature to be the maximum flight distance from breeding habitat.

Observations of the colonies in the Craigieburn/Epping area over two consecutive flight seasons (2004/5 and 2005/6) suggest that there are two populations that fly in alternate years; one may be substantially more numerous than the other. This means that populations not seen in one year could be found in the next, or large populations seen in one year could be much diminished in the second year. This is consistent with the biology of the species, in which the larval stage is thought to last for two or more years.

Deer Park area

Observations of a number of males demonstrated the existence of an additional population in the Deer Park area during the 2005/6 flight season. While there are no previous records of the species from that area, it is within the distributional range of the species as indicated by Museum Victoria specimens from Altona and Keilor (Fig. 1).

Some of the newly found sites are on private properties that are currently subject to assessment for potential development approval. At present it is not possible to publish details of floristics and habitat structure, land tenure and management activities at these new sites. This information will be important to gain further understanding of the species' requirements and will be made available in due course.

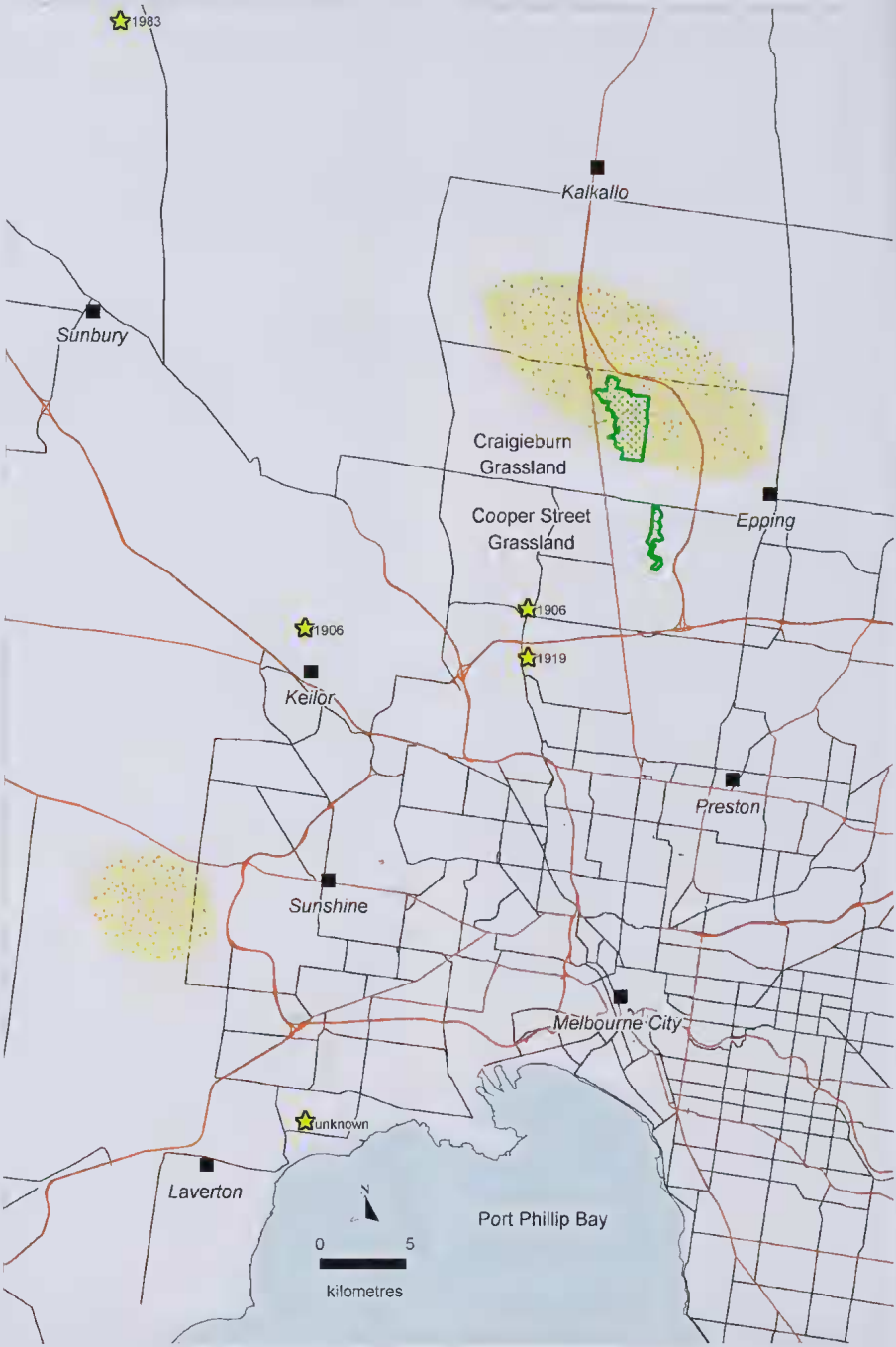

Fig. 1. Distribution of Golden Sun Moth records around Melbourne.

Since survey intensity has varied between sites, and surveys at some locations have been aimed simply at determining whether the species is present, the numbers of individuals documented at various sites does not necessarily reflect the relative size or importance of those populations.

Implications

The finding of these new populations around Melbourne suggests the Golden Sun Moth is more widespread and may have less specific habitat requirements than previously thought. Extensive surveys are now underway to improve our understanding of the distribution and habitat requirements of the species in the Melbourne area. It is hoped that this will assist with determining the relative size and importance of populations and therefore establishing priorities for conservation and management. Information gathered will also contribute to knowledge of what constitutes optimal habitat for the Golden Sun Moth.

In the meantime, the potential presence of the species should be considered for any area within the range of the species where native grassland or grassy woodland habitat is present.

Acknowledgements

The authors would like to thank Luisa Macmillan and Brian Bainbridge of Merri Creek Management Committee, Beverley van Praagh and Cheryl O'Dwyer. Our thanks also go to Ken Walker, Peter Lillywhite and Peter Marriott of Museum Victoria. Thanks also to Robert Baird, Bretan Clifford, Catherine Costello, Rohan Clarke and Ian Smales of Biosis Research Pty Ltd.

References

ACT Government (1998) Golden Sun Moth (*Synemon plana*): An endangered species. Action Statement No. 7. (Environment ACT: Canberra).

Clarke GM (2001) Survey and genetic analysis of NSW populations of the endangered golden sun moth, *Synemon plana* 2000. (CSIRO Entomology: Canberra)

Clarke GM and O'Dwyer C (2000) Genetic variability and population structure of the endangered Golden Sun Moth, *Synemon plana*. *Biological Conservation* **92**, 371-381.

O'Dwyer C (1999) The habitat of the Golden Sun Moth *Synemon plana* (Lepidoptera; Castniidae). In *The Other 99%. The Conservation and Biodiversity of Invertebrates*, pp 322-324. Ed W Ponder and D Lunney. (Royal Zoological Society of New South Wales: Mosman)

O'Dwyer C and Attiwill PM (1999) A comparative study of habitats of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae): implications for restoration. *Biological Conservation* **89**, 131-141.

O'Dwyer C, Hadden S and Arnold A (2000) Action Statement 106: Golden Sun Moth *Synemon plana*. (Department of Natural Resources and Environment: Victoria).

van Praagh BD (2004) New sightings of the Golden Sun Moth *Synemon plana* (Lepidoptera: Castniidae) at Craigieburn and Cooper Street Grasslands, Melbourne Victoria 2003/2004. (Unpublished report for the Department of Sustainability and Environment).

Received 4 May 2006; Accepted 23 November 2006

One Hundred Years Ago

EXCURSION TO WILSON'S PROMONTORY

Insects, generally speaking, were not plentiful, nor were any rarities secured. Those seen were such as are found at Beaumaris, Frankston, and along the Mornington Peninsula. The most favourable localities visited were the grass-tree flats on the south-east corner of the inlet and the valleys between Oberon and Waterloo Bays. Lepidoptera, chiefly micros, were most noticeable at the former locality, but although several of the well-known forms were fairly plentiful, the number of species was very limited. Among the butterflies, the Common Brown, *Heteronympha merope*, was very numerous on one of the ridges behind our landing-place, but, strange to say, we saw very few during the remainder of the trip. The Mountain Brown, *Tisiphone abeona*, as well as the Painted Lady, *Pyrameis kershawi*, and the Australian Admiral, *P. itea*, were met with every day. Amongst the "blues", *Neolucia agricola*, our Williamstown friend, was fairly common on Tongue Point, and still more so at Waterloo Bay. This species, which is also found in Tasmania and South Australia, seems to delight in situations exposed to strong sea winds. Five species of "skippers" (Hesperidæ) were taken, the rarest being *Hesperilla dispar* and *Mesodina halyzia*.

From *The Victorian Naturalist* **XXII** p 203, March 8, 1906